LIFE-AIR 1000®

HYPOTHERMIC THERAPY SYSTEM

SERVICE MANUAL

MODELS
PD2580, PD1000, PD1000-S, PD1000-1 & PD1000-1S

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IMPORTANT NOTICE

Caution: The repair, calibration and servicing of the ***LIFE-AIR 1000***® requires the skill of a qualified Medical Equipment Service person familiar with good practice for Medical Device Repair.

Service to be done only by Authorized Service Personnel. Improper repair can result in patient injury.

IMPORTANT NOTES - READ BEFORE SERVICING EQUIPMENT

This equipment contains static sensitive components. Proper static handling procedures and equipment must be used when servicing this equipment.

Perform a safety inspection after making repairs to the ***LIFE-AIR 1000***® and before returning the unit to service. A safety inspection procedure is included in this manual.

Safety Inspection Procedure

1. Fully assemble unit.

2. Perform a leakage and hi-pot test according to UL-544, CSA std C22.2 NO. 125-M1984, or IEC 601-1 requirements for non patient contact medical equipment as determined by your biomedical department. Refer to the above standard for the maximum allowable leakage.

3. Perform a Self-test of the unit as follows:
    a. Connect the air hose to the outlet located on the top of the unit.
    b. Plug unit into a proper power source as noted on the units rating label.
    c. Turn unit on.
    d. Press the Self-test button located on the bottom of the unit inside the test port. The "TEST" lamp will start flashing.
    e. Connect the hose to the self-test port.
    f. The temperature display will slowly climb into the overtemp area.
    g. After the display reaches the red area the "CAUTION" lamp will start to flash and the alarm will start to sound.
    h. After a few seconds the display will start to drop back to the normal operating range. When this happens the flashing lamps and the alarm should shut off.

There are 2 types of Time-out circuitry used in the ***LIFE-AIR 1000®***, each requires different testing procedures. The procedure to be used can be determined by looking into the air outlet on the top of the unit. If there is 1 thermal sensor in the Plenum use procedure #1, if there are 2 sensors use procedure #2.

4. Time-out test Procedure #1:
    a. Set the Main Power Switch to the "OFF" Position.
    b. Plug the ***LIFE-AIR 1000®*** into a properly grounded electrical outlet.
    c. Remove the hose from the top of the unit.
    d. Set the Heater Control Switch to the "110" setting.
    e. Turn the unit on.
    f. After about 4 minutes the circuit breaker should trip.
    g. Turn the unit off and reset it by depressing the circuit breaker located on the bottom front of the unit.

Safety Inspection Procedure

5. Time-out test procedure #2:
    a. Connect the hose to the Warm Air Port and to the Hose Storage Port.
    b. Set the Heater Control Switch to the "100" setting.
    c. Turn the unit on and allow to stabilize at the "100" setting.
    d. Disconnect the hose from the Hose Storage Port and press the Test Switch. The test light will flash.
    e. Block the free end of the hose by placing it on a hard flat surface.
    f. As the unit heats into the red zone, the Caution light will flash and the buzzer will sound.
    g. As the unit continues to heat, the Test light will stop flashing.
    h. The unit should trip the circuit breaker between 1 minute to 1 minute 30 seconds from the time the Test Lamp quits flashing.
    i. Reset circuit breaker

INSTRUCTIONS FOR REMOVAL OF ASSEMBLIES

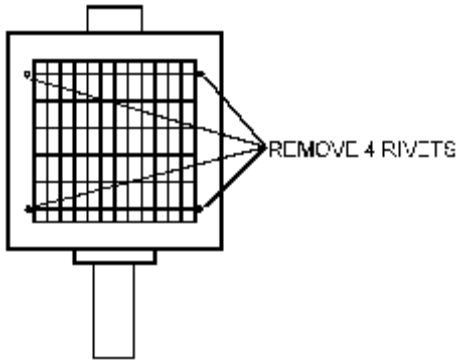
CAUTION: THE PLENUM AND FRONT PANEL ASSEMBLY CONTAIN STATIC SENSITIVE DEVICES.

PROPER HANDLING PRECAUTIONS MUST BE USED.

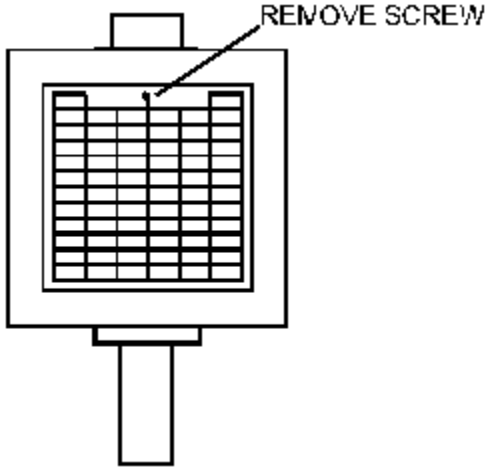
PD2580, PD1000/PD1000-S

1. Unplug unit from 120 VAC line.
2. Remove the Rear Filter Cover.
3. Remove the filter element
4. Using a 1/8 inch drill bit, drill out the 4 rivets holding the wire filter basket in place.
5. Remove the wire basket.

PD1000-1/PD1000-1S

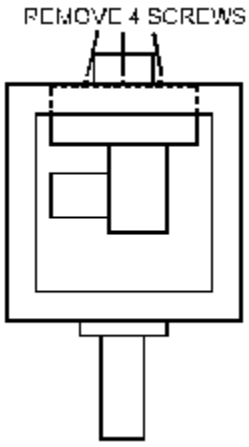


1. Unplug unit from any power source.
2. Remove the Rear Filter Cover.
3. Remove the filter element
4. Using a #2 Phillips screwdriver remove the screw and lock washer from the center top of the filter guard
5. Remove the wire basket.



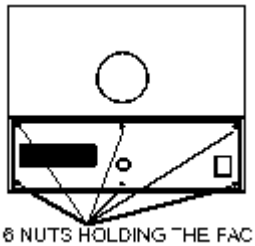
BLOWER AND PLENUM ASSEMBLY

1. Support the Blower and Plenum Assembly while removing the 4 screws from top hose interface.
2. Unplug the 3 pin harness from the temperature sensor to the Front Panel Control. Some units may have two 3 pin harnesses to be removed. If this is the case, the sensors must be marked so that they can be reconnected to the same location when reassembled. Keep the heat shrink with the plugs. This must be reinstalled to keep harnesses from vibrating free.
3. Unplug the 4 pin harness connecting the Front Panel Control and the Blower and Plenum Assembly.
4. Remove the Green wire from the Blower housing.
5. Remove the assembly from the back of the unit.
6. To remove the Blower from the Plenum assembly remove the 3 or 4 nuts holding the blower to the Plenum.



FRONT PANEL CONTROL AND FACE PLATE

1. Remove the Blower and Plenum assembly as shown above.
2. Remove the 6 #4 nuts from the studs holding the front panel to the chassis using a 1/4 inch nut driver.
3. Disconnect the brown wire from the Time-out control board. Some units may have connecters in-line with the brown wire. If this is the case disconnect the wire at the connecters.
4. Disconnect the White and Black wire harness using the in-line connectors.
5. Disconnect the 2 pin Self-test switch harness from the control board.
6. With a SHARP razor knife carefully cut the silicone sealant between the front panel and the chassis.
7. Lift the Front Panel from the chassis.



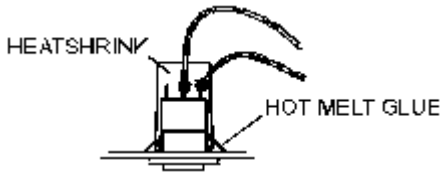
Special Instructions for Installation of the following Assemblies:

Temperature Controller & Faceplate:

When replacing this assembly it is required that a bead of clear Silicone Sealant be placed around the perimeter of the faceplate to provide a seal. This Assembly is STATIC SENSITIVE. Proper precautions must be used when removing or installing this Assembly.

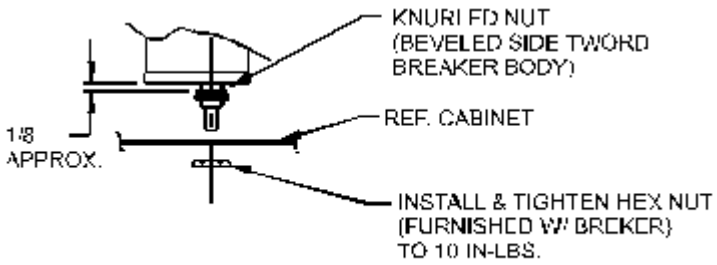
Test Switch Assembly:

When replacing this assembly it is necessary to seal the switch with a piece of heat-shrink and hot melt glue to provide a seal as done from the factory.



Circuit Breaker:

When replacing this part it must be sealed at the mounting surface and at the adjustment holes on the top of breaker. Hot melt glue or silicone sealant may be used for this.

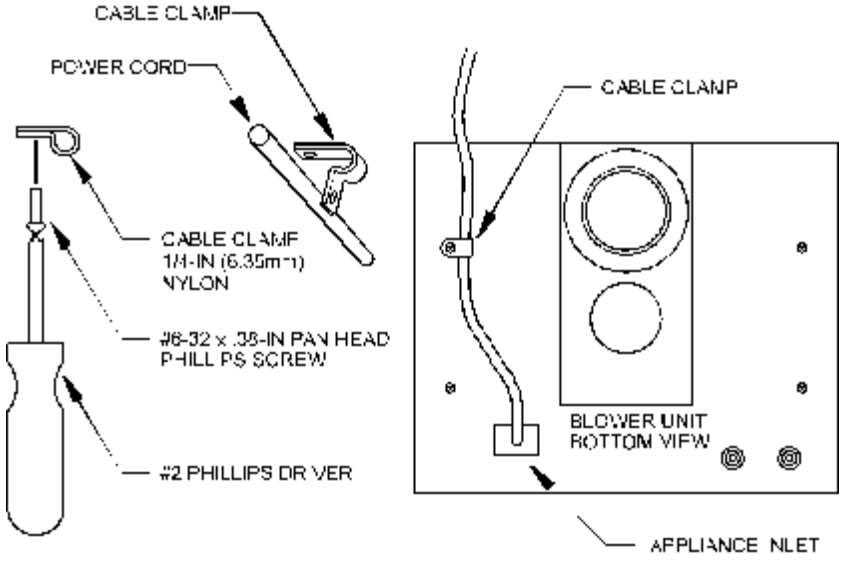


BREAKER ASSEMBY DETAIL

AC Power Cord:

When replacing the power cord the Heyco strain relief must be sealed at the mounting surface as received from the factory.

If the unit is a PD1000-1 or PD1000-1S the power cord is attached with a strain relief and plugged into an IEC connector on the bottom of the unit.



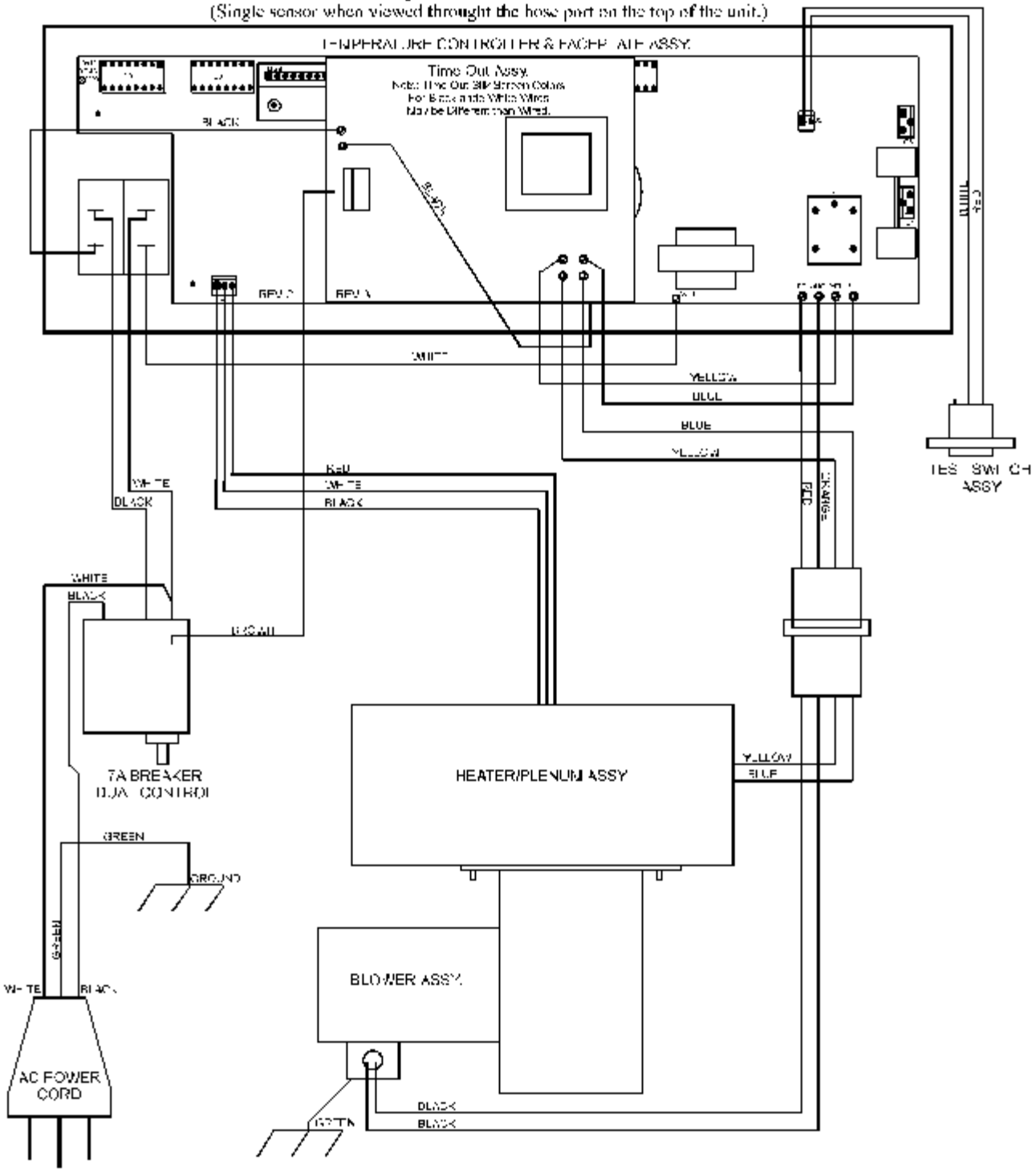
LIFE-AIR 1000® WIRING DIAGRAM

MODEL PD2580/PD1000

Rev. A

Using 4 Minute Time Out

(Single sensor when viewed throught the hose port on the top of the unit.)



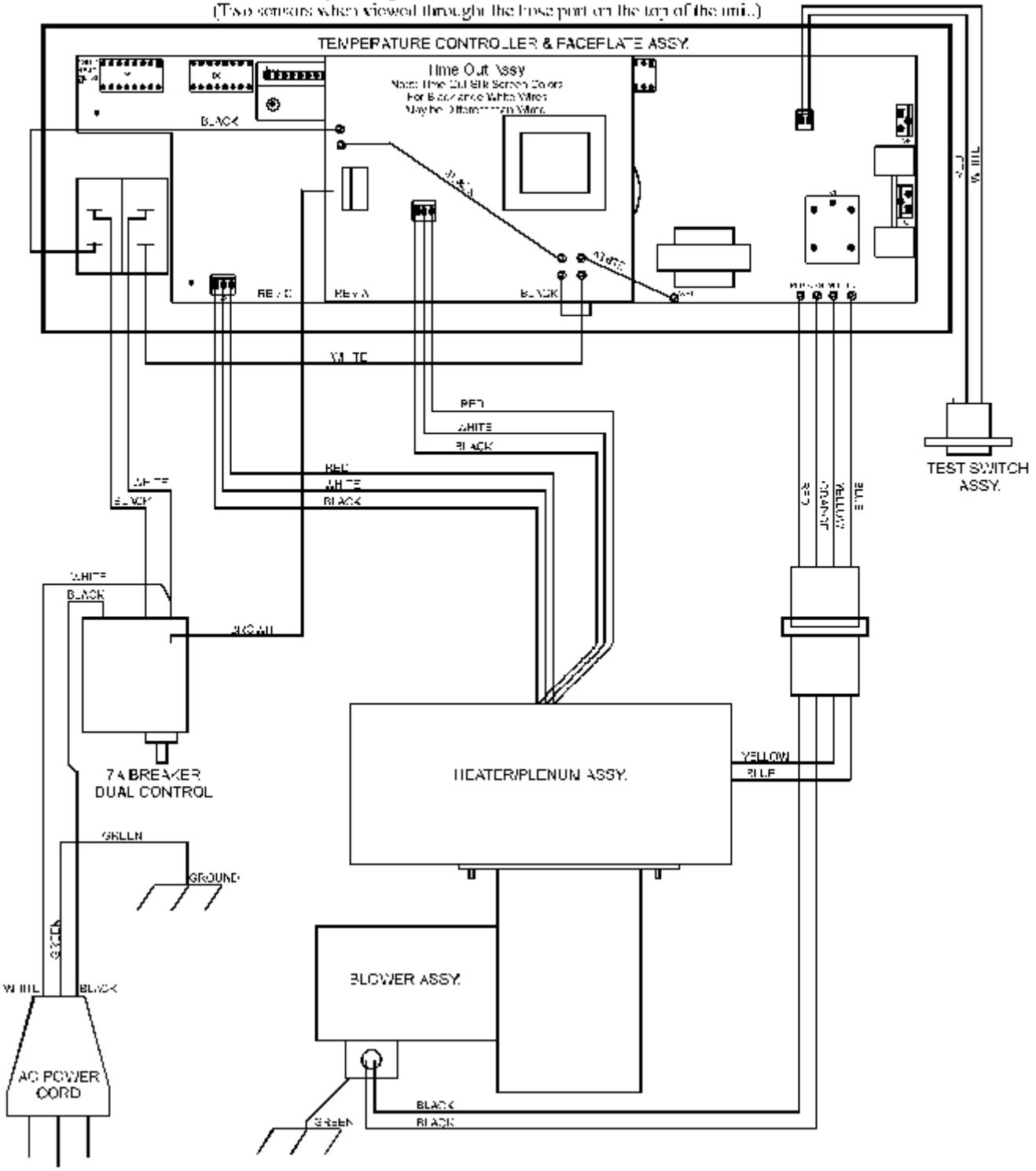
LIFE-AIR 1000® WIRING DIAGRAM

MODEL PD1000 PD1000-S

Rev. B

Using Temperature Controlled Time Out

(Two sensors when viewed through the hose port on the top of the unit.)



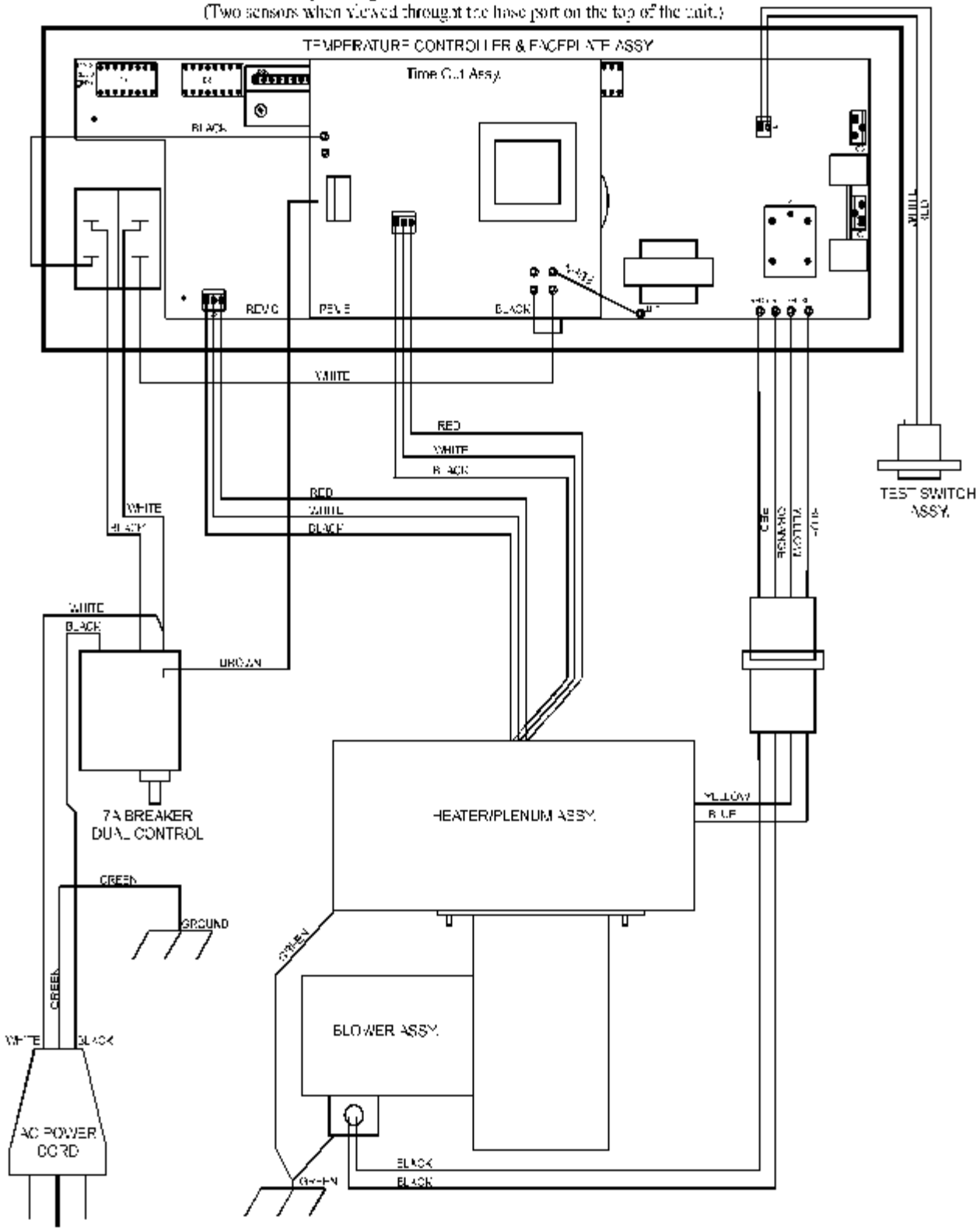
LIFE-AIR 1000® WIRING DIAGRAM

MODEL PD1000/PD1000-S

Rev. C & D

Using Temperature Controlled Time Out

(Two sensors when viewed through the hose port on the top of the unit.)

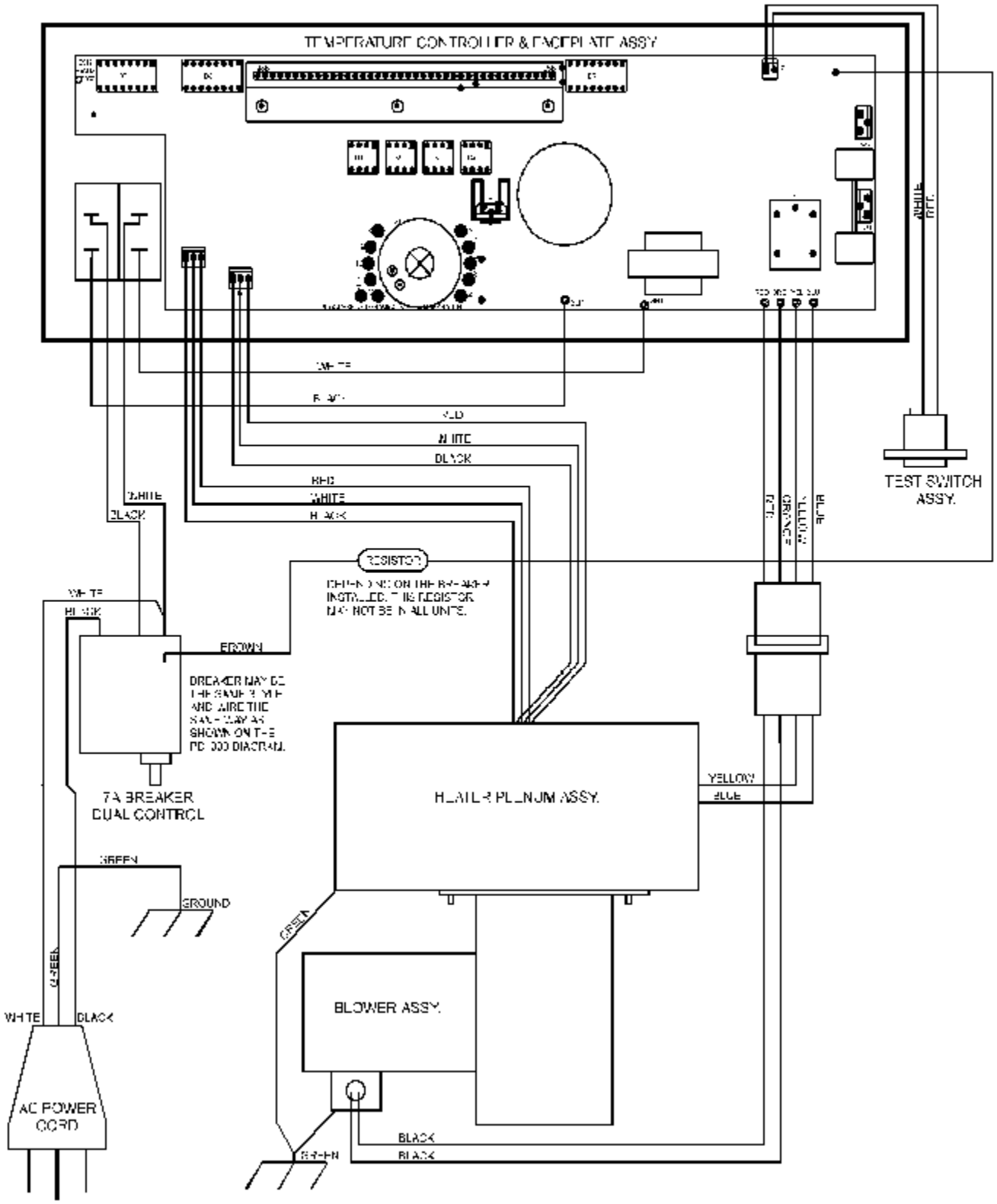


LIFE-AIR 1000® WIRING DIAGRAM

MODEL PD1000-1/PD1000-1S

Rev A.

(Two sensors when viewed through the hose port on the top of the unit.)

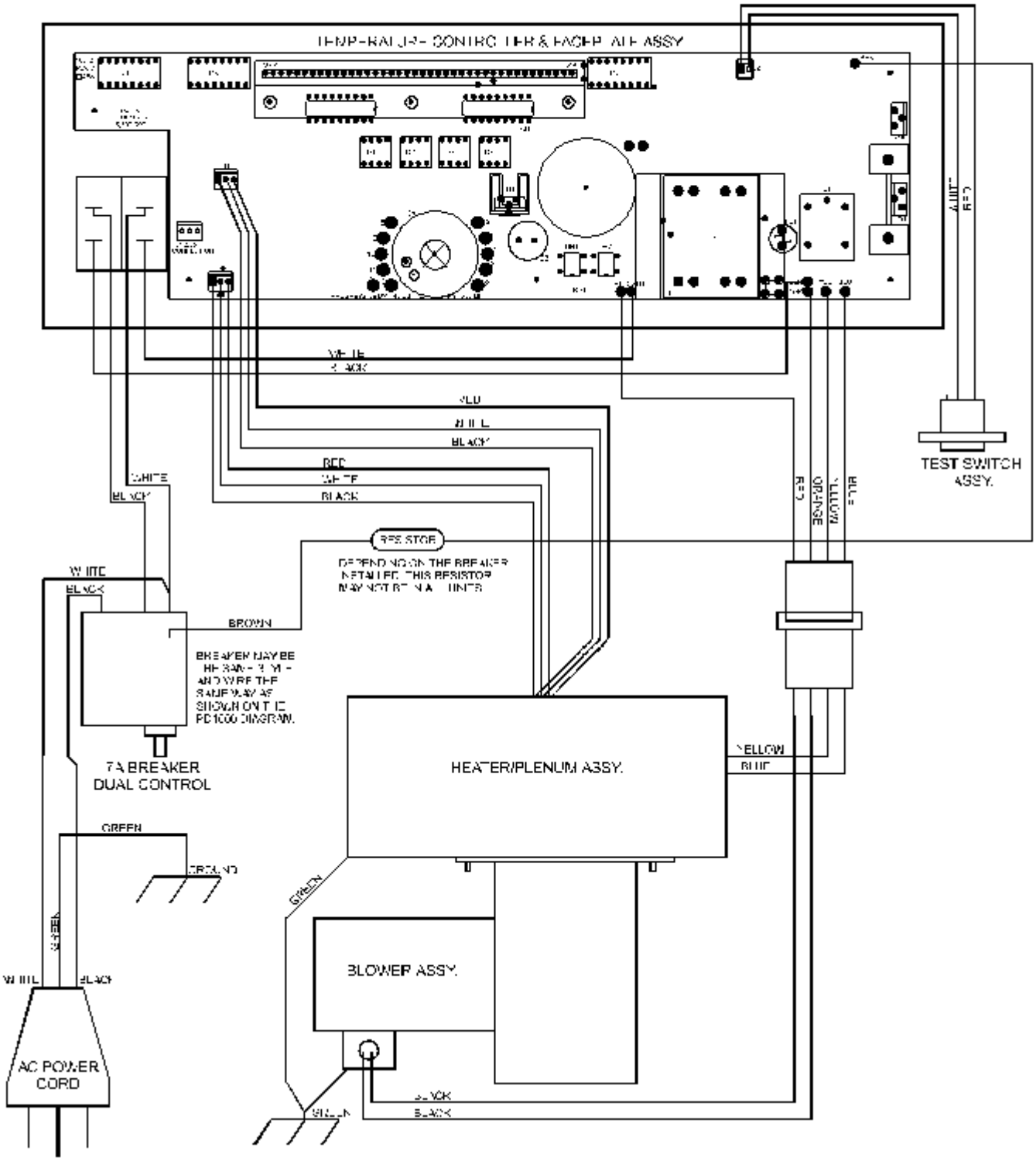


LIFE-AIR 1000® WIRING DIAGRAM

MODEL PD1000-1/PD1000-1S

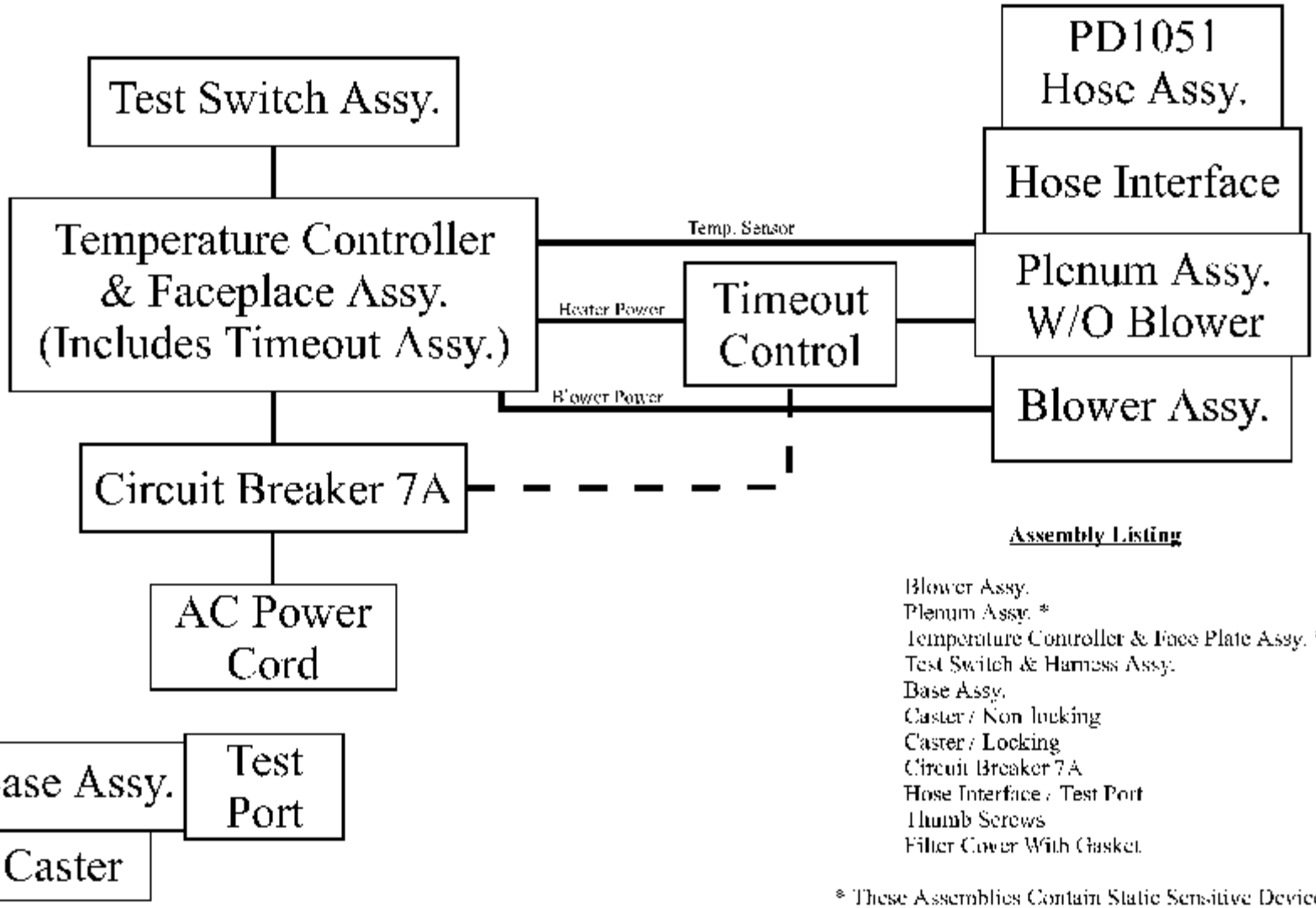
Rev B.

(Two sensors when viewed through the hose port on the top of the unit)



LIFE-AIR 1000® Block Diagram

MODEL PD2580, PD1000 PD1000-S



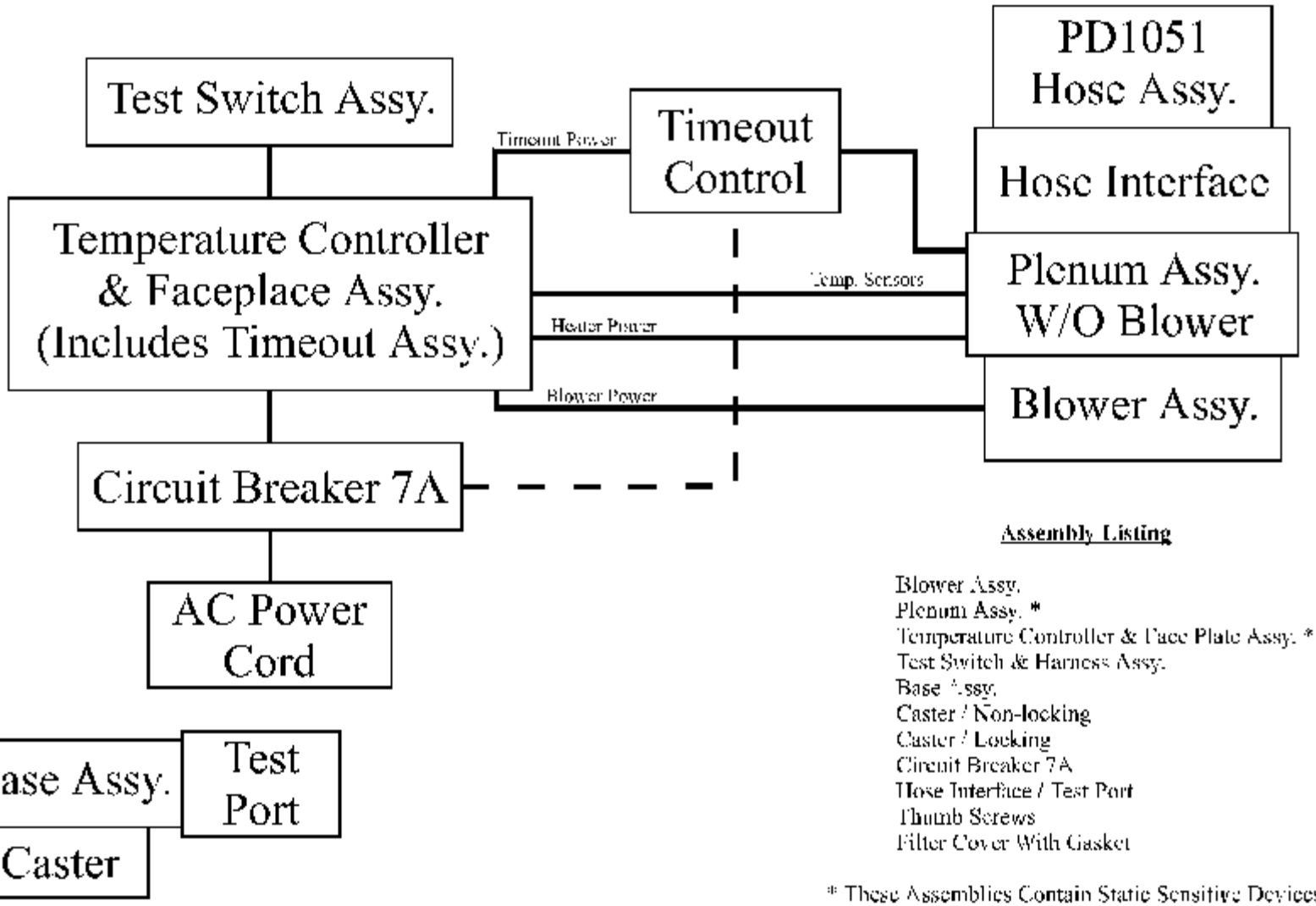
Assembly Listing

Blower Assy.
Plenum Assy. *
Temperature Controller & Face Plate Assy. *
Test Switch & Harness Assy.
Base Assy.
Caster / Non locking
Caster / Locking
Circuit Breaker 7A
Hose Interface / Test Port
Thumb Screws
Filter Cover With Gasket

* These Assemblies Contain Static Sensitive Devices

LIFE-AIR 1000® Block Diagram

MODELS PD1000-S, PD1000 with TEMPERATURE CONTROLLED TIME-OUT
REV B, REV C, REV D



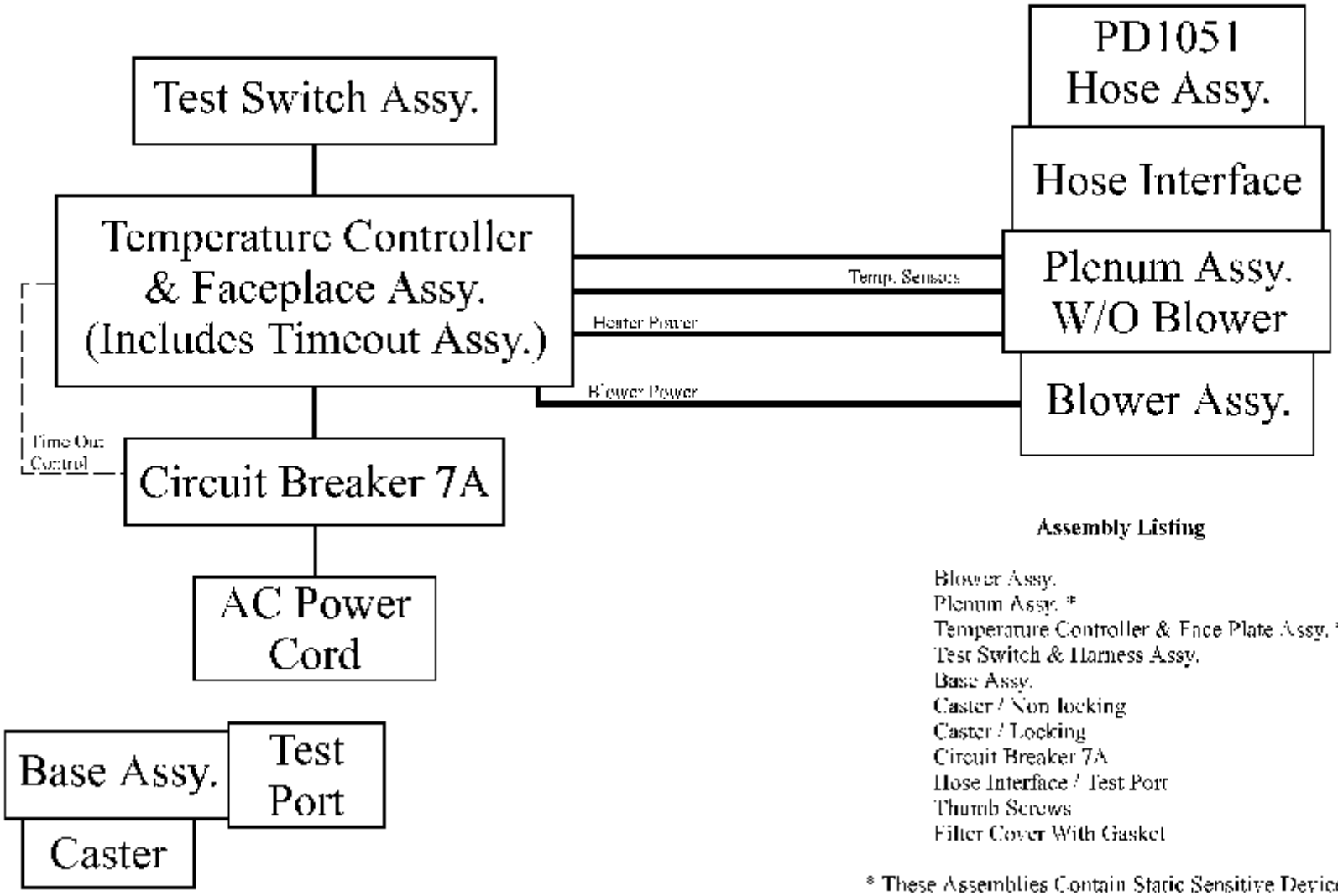
Assembly Listing

Blower Assy.
Plenum Assy. *
Temperature Controller & Face Plate Assy. *
Test Switch & Harness Assy.
Base Assy.
Caster / Non-locking
Caster / Locking
Circuit Breaker 7A
Hose Interface / Test Port
Thumb Screws
Filter Cover With Gasket

* These Assemblies Contain Static Sensitive Devices

LIFE-AIR 1000® Block Diagram

MODELS PD1000-1, PD1000-1S with TEMPERATURE CONTROLLED TIME-OUT
REV A

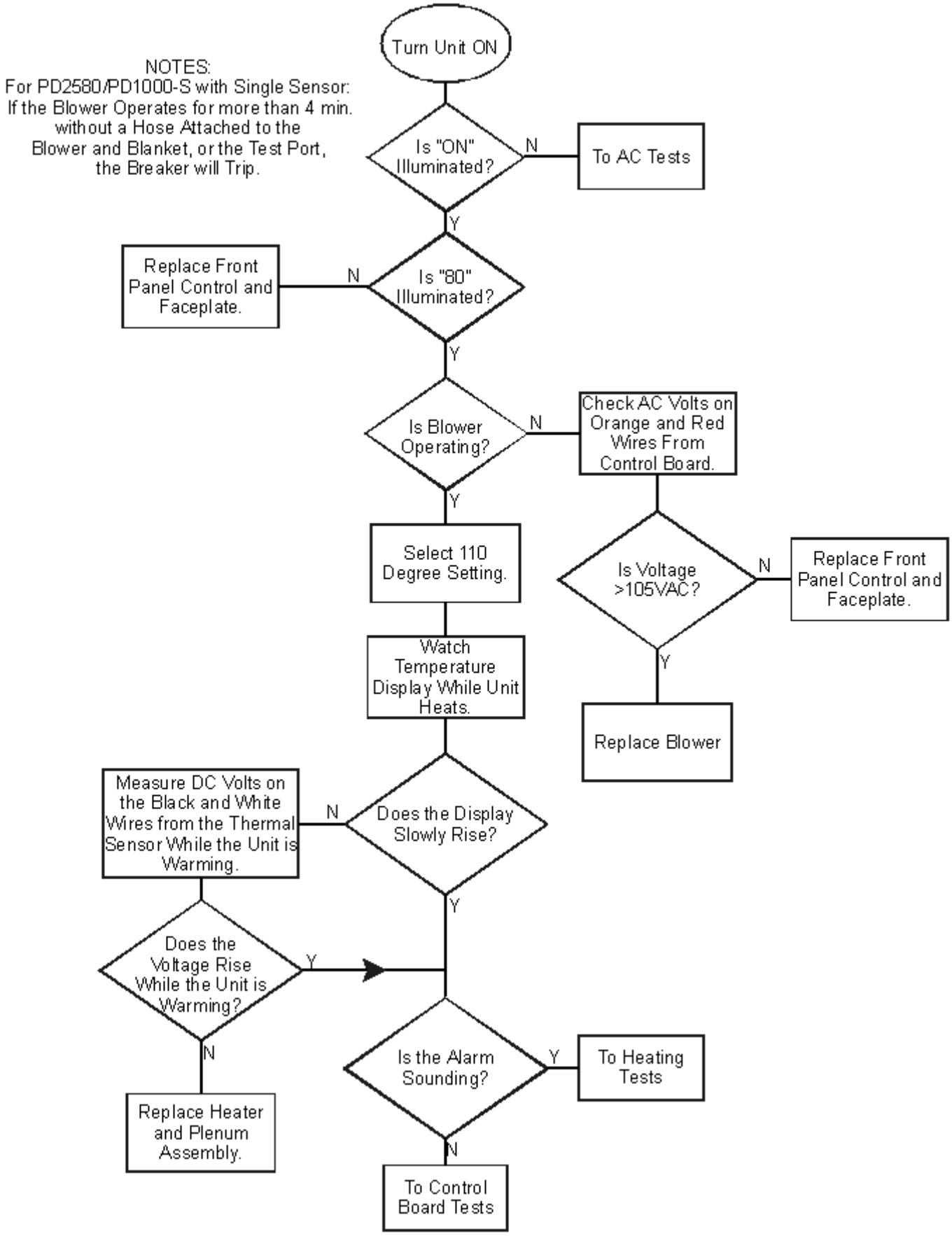


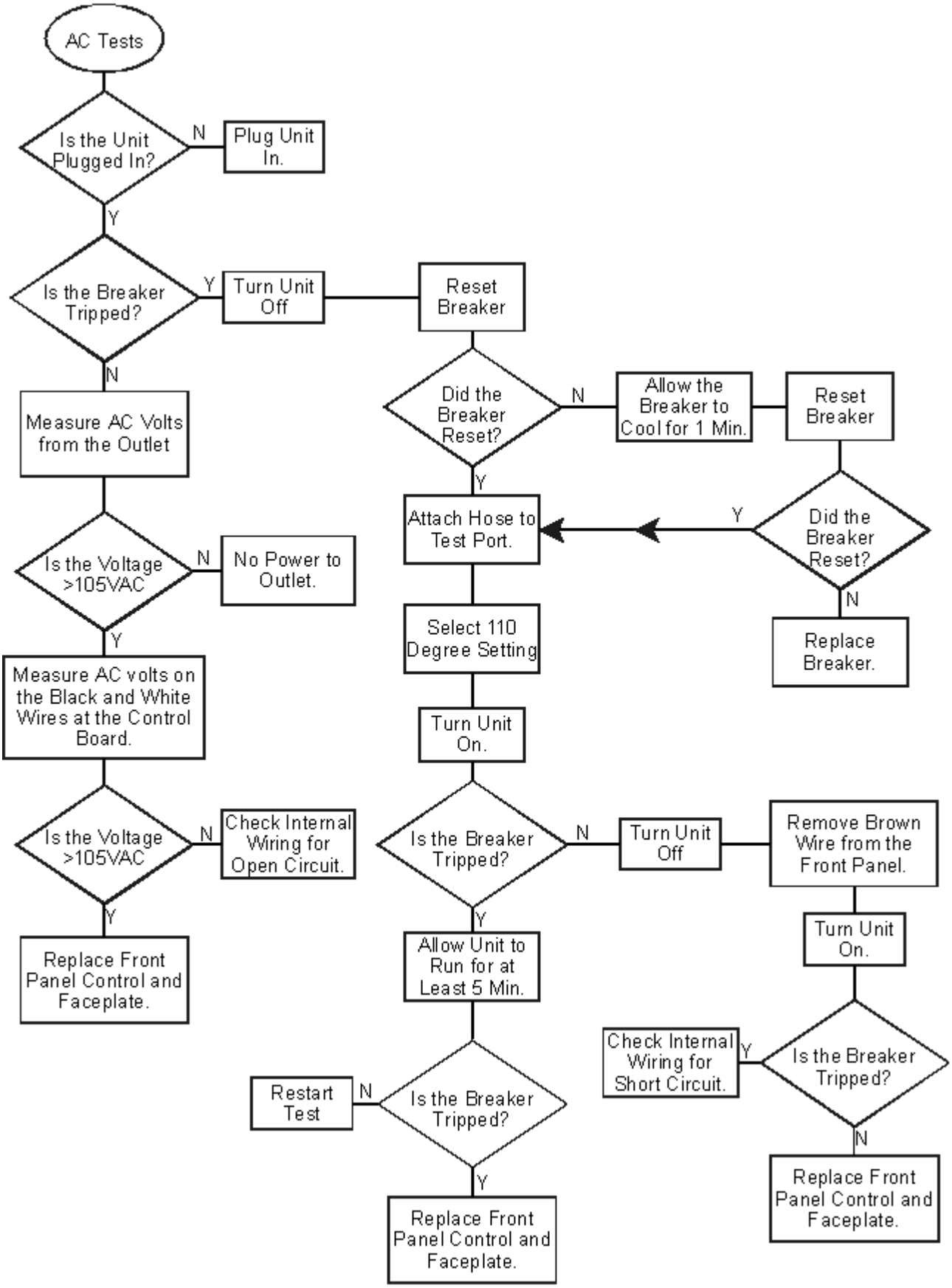
Assembly Listing

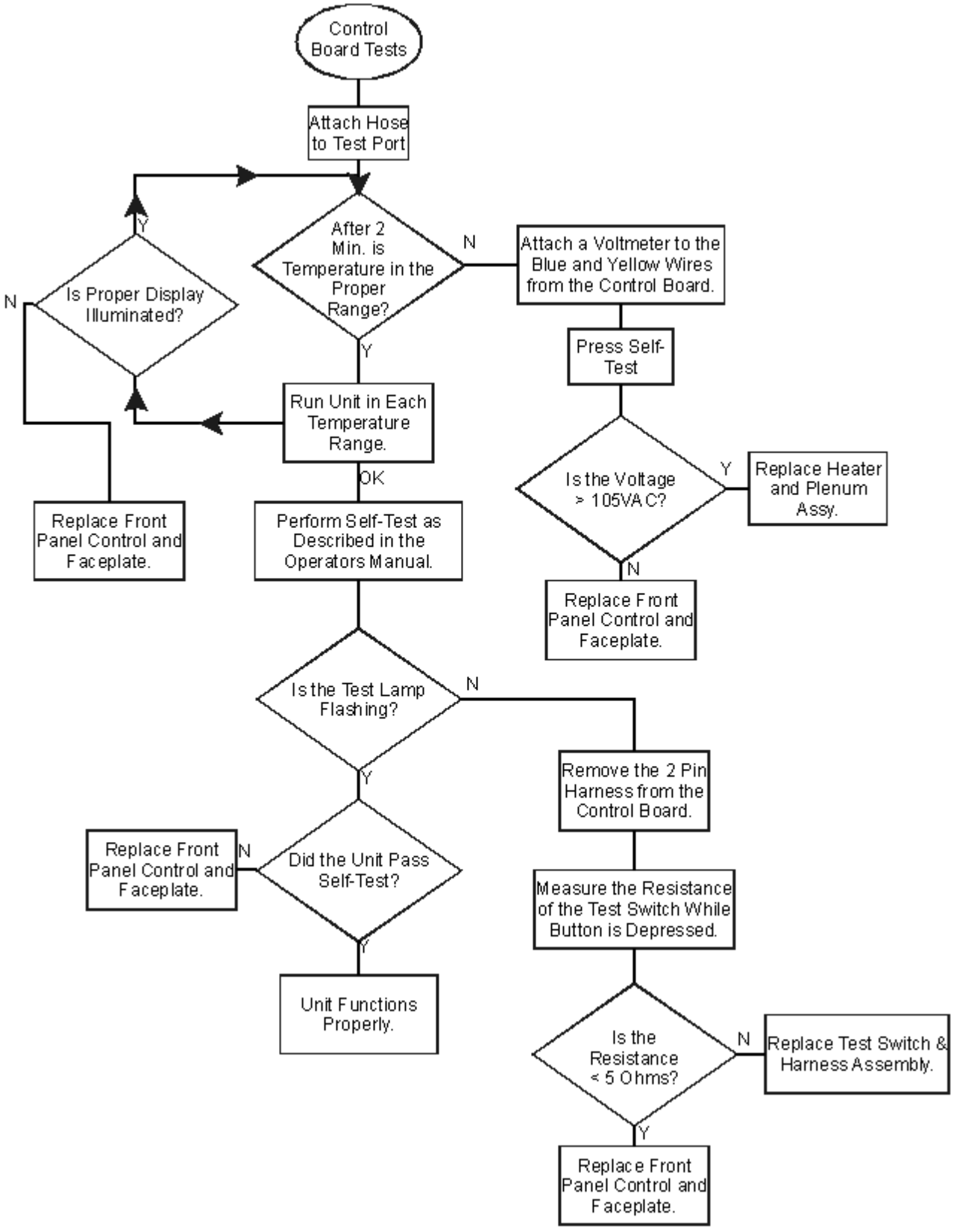
Blower Assy.
Plenum Assy. *
Temperature Controller & Face Plate Assy. *
Test Switch & Harness Assy.
Base Assy.
Caster / Non locking
Caster / Locking
Circuit Breaker 7A
Hose Interface / Test Port
Thumb Screws
Filter Cover With Gasket

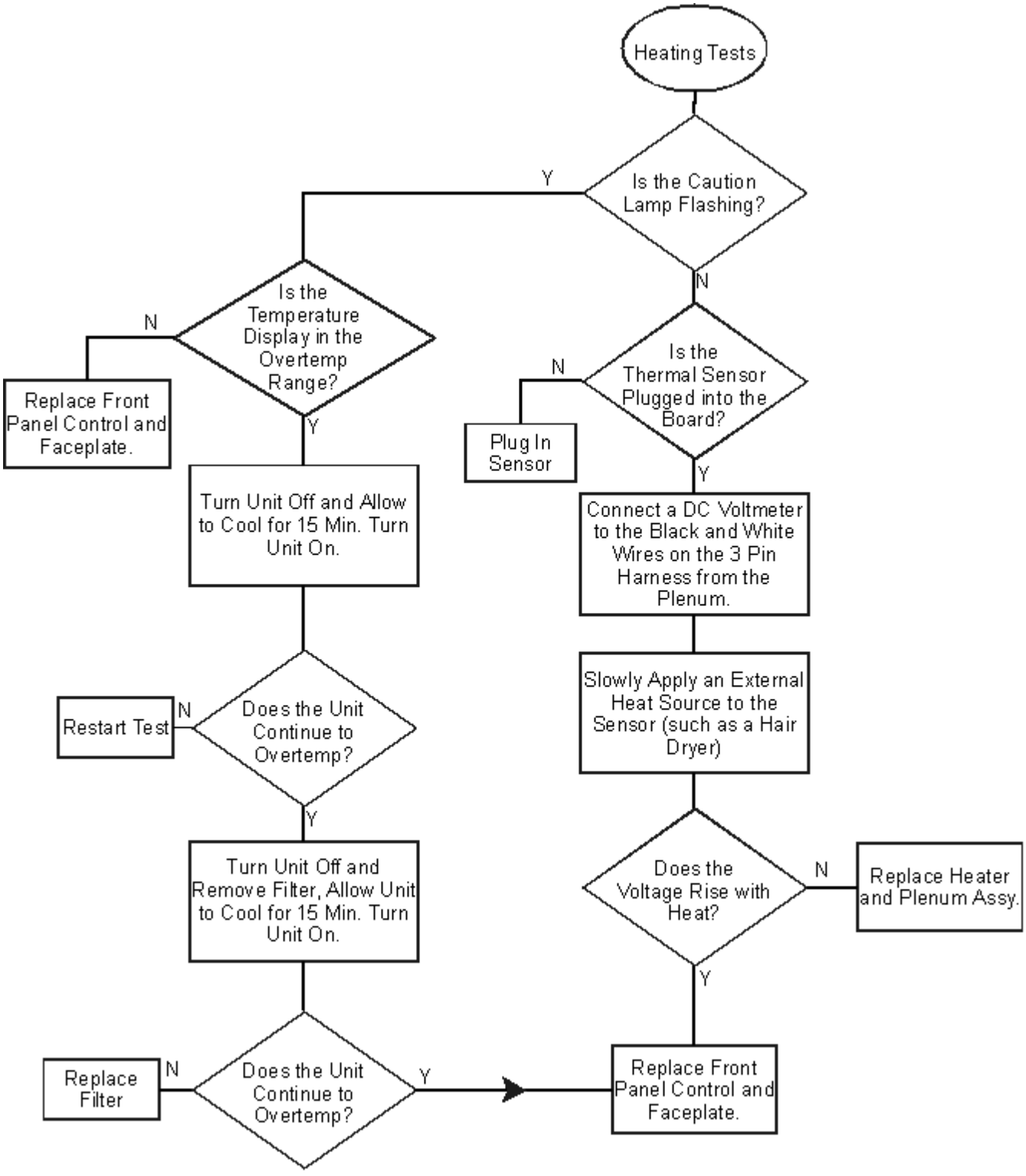
* These Assemblies Contain Static Sensitive Devices

Setup:
Plug Unit into 120VAC.Select 80 Degree Setting Attach Hose to Blower Outlet.




AC Tests
Is the Unit Plugged In?
N
Plug Unit In.
Y
Is the Breaker Tripped?
Y
Turn Unit Off
Reset Breaker
N
Measure AC Volts from the Outlet
Did the Breaker Reset?
N
Allow the Breaker to Cool for 1 Min.
Reset Breaker
Y
Attach Hose to Test Port.
Y
Did the Breaker Reset?
N
Replace Breaker.
Is the Voltage >105VAC
N
No Power to Outlet.
Y
Select 110 Degree Setting
Measure AC volts on the Black and White Wires at the Control Board.
Turn Unit On.
Is the Voltage >105VAC
N
Check Internal Wiring for Open Circuit.
Is the Breaker Tripped?
N
Turn Unit Off
Remove Brown Wire from the Front Panel.
Y
Replace Front Panel Control and Faceplate.
Y
Allow Unit to Run for at Least 5 Min.
Turn Unit On.
Check Internal Wiring for Short Circuit.
Y
Is the Breaker Tripped?
Restart Test
N
Is the Breaker Tripped?
N
Y
Replace Front Panel Control and Faceplate.
Y
Replace Front Panel Control and Faceplate.


Control Board Tests
Attach Hose to Test Port
After 2 Min. is Temperature in the Proper Range?
N
Attach a Voltmeter to the Blue and Yellow Wires from the Control Board.
Y
Is Proper Display Illuminated?
N
Y
Press Self-Test
Run Unit in Each Temperature Range.
OK
Is the Voltage > 105VAC?
Y
Replace Heater and Plenum Assy.
N
Replace Front Panel Control and Faceplate.
Perform Self-Test as Described in the Operators Manual.
Replace Front Panel Control and Faceplate.
Is the Test Lamp Flashing?
N
Y
Remove the 2 Pin Harness from the Control Board.
Replace Front Panel Control and Faceplate.
N
Did the Unit Pass Self-Test?
Measure the Resistance of the Test Switch While Button is Depressed.
Y
Unit Functions Properly.
Is the Resistance < 5 Ohms?
N
Replace Test Switch & Harness Assembly.
Y
Replace Front Panel Control and Faceplate.


Heating Tests
Is the Caution Lamp Flashing?
Y
N
Is the Temperature Display in the Overtemp Range?
N
Y
Replace Front Panel Control and Faceplate.
Turn Unit Off and Allow to Cool for 15 Min. Turn Unit On.
Does the Unit Continue to Overtemp?
N
Restart Test
Y
Turn Unit Off and Remove Filter, Allow Unit to Cool for 15 Min. Turn Unit On.
Does the Unit Continue to Overtemp?
N
Replace Filter
Y
Is the Thermal Sensor Plugged into the Board?
N
Plug In Sensor
Y
Connect a DC Voltmeter to the Black and White Wires on the 3 Pin Harness from the Plenum.
Slowly Apply an External Heat Source to the Sensor (such as a Hair Dryer)
Does the Voltage Rise with Heat?
N
Replace Heater and Plenum Assy.
Y
Replace Front Panel Control and Faceplate.

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